In the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-31. (Canceled)

32. (New) A time-of-flight mass spectrometer comprising:

a) ion flight path means defining a flight path for ions and having an ion entrance and an ion exit, the ion flight path means comprising:

i) at least one field free region;

ii) at least one electric sector, each electric sector having an entry and an outlet; and

iii) at least one ion optical element, wherein

at least one of the ion optical elements is each disposed at either the entry or the outlet of at least one of the electric sectors,

at least one of the ion optical elements so disposed comprises at least one trim electrode that modifies the potential experienced by an ion entering or exiting the electric sector at which it is disposed,

at least one of the trim electrodes is adjustable, wherein the adjustable trim electrodes adjustably modify the potential experienced by an ion entering or exiting the electric sector at which it is disposed, and

the adjustable trim electrodes are independently adjustable with respect to each other;

b) an ion source in communication with the ion entrance of the ion flight path means; and

c) an ion detector in communication with the ion exit of the ion flight path means.

33. (New) The mass spectrometer of claim 32, wherein the ion flight path means further comprises an Einzel lens.

34. (New) The mass spectrometer of claim 32, wherein at least one of the adjustable trim electrodes is a pair of adjustable electrodes, the pair of electrodes being disposed such that the ions in the ion flight path pass between the paired electrodes.

35. (New) The mass spectrometer of claim 32, wherein at least one of the ion optical elements is disposed at each entry and each outlet of each of the electric sectors.

36. (New) The mass spectrometer of claim 35, wherein each of the adjustable trim electrodes is a pair of adjustable electrodes, each pair of electrodes being disposed such that the ions in the ion flight path pass between the paired electrodes.

37. (New) The mass spectrometer of claim 36, wherein:

the at least one electric sector is four sequentially ordered electric sectors;

the at least one field free region is at least three field free regions;

the first, second, and third electric sectors are each followed by at least one of the field free regions; and

each of the electric sectors has a deflection angle of about 270 degrees.

38. (New) The mass spectrometer of claim 32-37, wherein the ion source is a laser desorption/ionization ion source.

39. (New) The mass spectrometer of claim 32, wherein the ion source is selected from the group consisting of: a

chemical ionization ion source, an electron impact ionization ion source, a photoionization ion source, and an electrospray ionization ion source.

40. (New) The mass spectrometer of claim 32, wherein the ion source is configured to selectively provide ions of one or more masses or ranges of masses.

41. (New) The mass spectrometer of claim 32, wherein the ion source comprises a quadrupole ion trap or a linear ion trap.

42. (New) The mass spectrometer of claim 32, wherein the ion source is configured to extract a group of ions from a pulsed or continuous ion beam, wherein the direction of extraction is substantially orthogonal to the direction of the beam.

43. (New) The mass spectrometer of claim 32, wherein the ion source is configured to accelerate a pulse of ions from the ion source to the ion entrance of the ion flight path means.

44. (New) The mass spectrometer of claim 43, wherein the ion source is further configured to apply a voltage pulse subsequent to formation of ions therein, thereby accelerating the pulse of ions.

45. (New) The mass spectrometer of any one of claims 34 and 36, wherein:

each pair of adjustable electrodes comprises an inner adjustable electrode and an outer adjustable electrode, and

all of the inner adjustable electrodes are adjusted to substantially the same first potential and all of the outer adjustable electrodes are adjusted to substantially the same second potential.

46. (New) The mass spectrometer of claim 37, wherein the ion flight path means further comprises at least one field free region before the first electric sector and at least one field free region after the last electric sector.

47. (New) The mass spectrometer of claim 37, wherein the field free region between the first and second electric sectors is substantially the same length as the field free region between the third and fourth electric sectors.

48. (New) The mass spectrometer of claim 46, wherein the field free region before the first electric sector is substantially the same length as the field free region after the last electric sector.

49. (New) The mass spectrometer of claim 46, wherein the field free region between the second and third electric sectors is substantially two times the length of either or both the field free region before the first electric sector or the field free region after the last electric sector.

50. (New) The mass spectrometer of claim 32 further comprising at least one Herzog shunt having an aperture, wherein each Herzog shunt is associated with either the entry or the outlet of at least one of the electric sectors, such that the ions pass through the aperture upon entry or exit of the electric sector associated therewith.

51. (New) The mass spectrometer of claim 32 further comprising an enclosure, wherein the enclosure is configured to enclose at least one of the electric sectors.

52. (New) The mass spectrometer of claim 51, wherein the enclosure has at least one aperture, wherein at least one of the apertures is configured as a Herzog shunt.

53. (New) The mass spectrometer of claim 32 further comprising a control system configured to adjust at least one of the adjustable trim electrodes.

54. (New) A method for performing time-of-flight mass spectrometry, the method comprising the steps of:

providing at least one ion having a non-zero kinetic energy;

deflecting at least one of the ions in a curved electric field, wherein the curved electric field is defined by an electric sector, the electric sector having an entry and an outlet;

modifying the potential experienced by at least one of the ions so deflected upon its entry into the electric sector entry or its exit from the electric sector outlet; and

detecting the arrival of at least one of the ions so deflected at an ion detector, wherein the detector is positioned such the ion so detected traverses at least one field-free region prior to arrival at the ion detector, wherein

the step of modifying the potential is effected by an ion optical element disposed at the entry or the outlet at which the potential is modified, and

the ion optical element comprises at least one trim electrode.

55. (New) The method of claim 54, wherein the step of modifying the potential comprises:

adjusting at least one of the trim electrodes, wherein the adjustment modifies the potential experienced by the at least one of the ions so modified upon its entry or exit of the electric sector.

56. (New) The method of claim 54, wherein the step of providing the at least one ion comprises:

ionizing a sample by laser desorption ionization, thereby yielding the at least one ion; and

accelerating the at least one ion in an electric field, thereby conferring the non-zero kinetic energy on the at least one ion.